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L-01-154

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 2001-003-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 2001-003-00, 10 CFR 50.73(a)(2)(iv), "Automatic Reactor Trip Due to Low Steam Generator Water Level."

Robert E. Donnellon
FOR

Lew W. Myers

Attachment

IE24

Rec'd 01/18/02

cc: Mr. H. J. Miller, Regional Administrator
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LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Beaver Valley Power Station Unit No. 1

2. DOCKET NUMBER

05000334

3. PAGE

1 of 4

4. TITLE

Automatic Reactor Trip Due to Low Steam Generator Water Level.

5. EVENT DATE

MO	DAY	YEAR
11	06	2001

6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO
2001	003	00

7. REPORT DATE

MO	DAY	YEAR
12	21	2001

8. OTHER FACILITIES INVOLVED

FACILITY NAME

None

DOCKET NUMBER

FACILITY NAME

DOCKET NUMBER

9. OPERATING
MODE

1

10. POWER
LEVEL

100 %

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)

20.2203(a)(3)(ii)

50.73(a)(2)(ii)(B)

50.73(a)(2)(ix)(A)

20.2201(d)

20.2203(a)(4)

50.73(a)(2)(iii)

50.73(a)(2)(x)

20.2203(a)(1)

50.36(c)(1)(i)(A)

X 50.73(a)(2)(iv)(A)

73.71(a)(4)

20.2203(a)(2)(i)

50.36(c)(1)(ii)(A)

50.73(a)(2)(v)(A)

73.71(a)(5)

20.2203(a)(2)(ii)

50.36(c)(2)

50.73(a)(2)(v)(B)

OTHER
Specify in Abstract below or in
NRC Form 366A

20.2203(a)(2)(iii)

50.46(a)(3)(ii)

50.73(a)(2)(v)(C)

20.2203(a)(2)(iv)

50.73(a)(2)(i)(A)

50.73(a)(2)(v)(D)

20.2203(a)(2)(v)

50.73(a)(2)(i)(B)

50.73(a)(2)(vii)

20.2203(a)(2)(vi)

50.73(a)(2)(i)(C)

50.73(a)(2)(viii)(A)

20.2203(a)(3)(i)

50.73(a)(2)(ii)(A)

50.73(a)(2)(viii)(B)

12. LICENSEE CONTACT FOR THIS LER

NAME

T. S. Cosgrove, Manager Regulatory Affairs

TELEPHONE NUMBER (Include Area Code)

(724) 682-5203

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX
X	JB	FCV	W351	Yes					

14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE)

X

NO

15. EXPECTED
SUBMISSION
DATE

MONTH

DAY

YEAR

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

At 1416 hours on November 6, 2001, Beaver Valley Power Station Unit No. 1 reactor automatically tripped from 100% power due to low-low level in the C Steam Generator. The Feedwater Level Control Valve on the C Steam Generator unexpectedly failed closed causing the C Steam Generator water level to rapidly drop and reach the low-low water level reactor trip setpoint. Prior to the reactor trip, the Control Board Operator attempted to open the Feedwater Level Control Valve in manual control and observed no increase in the demand signal indicator or feedwater flow. After the reactor trip, Emergency Operating Procedure E-0 for Reactor Trip was performed and the plant was stabilized in Mode 3.

The automatic initiation of a reactor trip from 100% power via the Reactor Protection System on November 6, 2001, was a valid reactor trip and was not part of a pre-planned sequence during testing or reactor operation. Therefore this event is reportable pursuant to 10 CFR 50.72(b)(2)(iv)(B) and 50.73(a)(2)(iv)(A). The cause of the unexpected closure of the C Main Feedwater Regulating Valve was a random failure of a diode in the 7100 process rack module that controls the valve actuator. The safety significance of the automatic reactor trip on November 6, 2001 was small.

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PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor System
Feedwater/ Steam Generator Water Level Control System (JB)

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1 at 100 % power

There were no systems, structures, or components that were inoperable that contributed to the event. One system air compressor was out of service at the time.

DESCRIPTION OF EVENT

At 1416 hours on November 6, 2001, Beaver Valley Power Station Unit No. 1 reactor automatically tripped from 100% power due to low-low level in the C Steam Generator. The Feedwater Level Control Valve on the C Steam Generator unexpectedly failed closed causing the C Steam Generator water level to rapidly drop and reach the low-low water level reactor trip setpoint. Prior to the reactor trip, the Control Board Operator attempted to open the Feedwater Level Control Valve in manual control and observed no increase in the demand signal indicator or feedwater flow. After the reactor trip, Emergency Operating Procedure E-0 for Reactor Trip was performed and the plant was stabilized in Mode 3.

REPORTABILITY

The automatic initiation of a reactor trip from 100% power via the Reactor Protection System on November 6, 2001, was a valid reactor trip and was not part of a pre-planned sequence during testing or reactor operation. Therefore this event is reportable pursuant to 10 CFR 50.72(b)(2)(iv)(B) and 50.73(a)(2)(iv)(A). The NRC was notified that an automatic reactor trip occurred at BVPS Unit 1 pursuant to 10 CFR 50.72 (b)(2)(iv)(B) at 1538 hours on November 6, 2001 (ENS No. 38472).

CAUSE OF EVENT

The direct cause of the reactor trip was due to low-low level in the C Steam Generator, which was preceded by the unexpected closure of the C Main Feedwater Regulating Valve. Closure of the feedwater regulating valve resulted in a loss of feedwater flow to the C Steam Generator and the rapid decrease in steam generator water level.

The cause of the unexpected closure of the C Main Feedwater Regulating Valve was the failure of a diode in the 7100 process rack module that controls the valve actuator, causing the output of the Power Supply regulator board to rise from 35 volts to 51.55 volts. This higher voltage resulted in the output of the valve limiter to not rise above 3.8 milliamps. The control range is 4 to 20 milliamps. Since this limiter is common to both the manual and automatic control circuits and with the output

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limited to the 3.8 millamps value, the actuator would not respond to either Manual or Automatic control commands.

There was no evidence that voltage spikes or overheating were involved. In addition, the controller was replaced approximately one and one half years ago; therefore, age was not considered a factor. Thus, the diode failure was categorized as a random failure.

SAFETY IMPLICATIONS

Following the automatic reactor trip, the control rods fully inserted into the reactor core and the required safety systems operated as designed. Emergency Operating Procedure E-0 for Reactor Trip was performed and the plant was stabilized in Mode 3.

This event was an automatic reactor trip from full power, which is less severe than the design basis event for Loss of External Electrical Load and/or Turbine Trip from full power. The Loss of External Electrical Load and/or Turbine Trip is analyzed in BVPS Unit No. 1 UFSAR Section 14.1.7. Comparison of the UFSAR Loss of External Electrical Load and/or Turbine Trip with this event indicates that BVPS Unit 1 operated conservatively regarding the UFSAR transient in comparison to the UFSAR analysis assumptions/results. The actual plant response for this event was bounded by the UFSAR analysis for a Loss of External Electrical Load and/or Turbine Trip.

The plant risk associated with this BVPS Unit 1 automatic reactor trip on November 6, 2001 due to low steam generator water level is considered to be low. This is based on the conditional core damage probability for the event when considering the trip occurred during plant operation in Mode 1 at 100% reactor power given a partial loss of main feedwater with one system air compressor out of service.

Based on the above, the safety significance of the automatic reactor trip on November 6, 2001 was small.

CORRECTIVE ACTIONS

1. The deficiency in the Main Feedwater Regulating Valve FC-1FW-498 controller was corrected.
2. A failure analysis will be performed on the failed controller components for FC-1FW-498.
3. Additional enhancements are being investigated for 7100 module components, including power supplies and controllers.

Corrective action completion is being tracked through the corrective action program.

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PREVIOUS SIMILAR EVENTS

A review of past Beaver Valley Power Station Units 1 and 2 Licensee Event Reports found two similar events involving a reactor trip associated with steam generator water level within the last five years:

- BVPS Unit 1 LER 98-028, "Automatic Reactor Trip on 'A' Steam Generator Low Level Coincident with Steam Flow/Feed Flow Mismatch Signal from Manual Tripped Transmitter Bistables of F-MS-475."
- BVPS Unit 1 LER 97-025, "Ground in Feedwater Flow Controller Results in High Steam Generator Level and Subsequent Turbine Trip/Reactor Trip."